

IN THE CLAIMS

1. (Currently Amended) A method of controlling rock drilling, the method comprising:  
drilling rock with a rock drilling apparatus including a carrier, a feeding beam, a rock drill movable with respect to the feeding beam, and a control unit for controlling the rock drilling, and the rock drilling having operating parameters including impact, feed, rotation, and flushing,

providing a memory of the control unit with default settings for drilling,  
measuring an operation of the apparatus during drilling, and  
adjusting at least one operating parameter of drilling to accomplish a desired control operation, said adjusting step including:

providing an operating system of the control unit with at least two simultaneously active control modes with different control strategies, each control mode determining at least one criterion to be measured during drilling, a threshold value for a measurement result, and at least one adjustable operating parameter, prioritizing one control mode over the other control modes such that an affect of the prioritized control mode increases and simultaneously affects of the other control modes diminish, and

calculating, based on the measurement results, control values for the operating parameters to be adjusted in the control unit in order to automatically control the drilling such that the control strategy of the prioritized control mode is weighted relative to the other control modes.

2. (Original) A method according to claim 1, comprising:  
providing the control unit with a user interface,  
arranging an operating area of the shape of a plane geometrical polygon in the user interface,  
selecting the operating point of the control by moving a control cursor in the operating area,  
placing one control mode in each corner of the operating area, and

calculating a weighting coefficient for each control mode by means of the distance between the operating point and the corners.

3. (Currently Amended) A ~~control system~~ for a rock drilling apparatus comprising:

a carrier,

a feeding beam,

a rock drill movable with respect to the feeding beam, and

a control system including:

a control unit provided with a user interface for controlling the drilling,  
at least one sensor for measuring drilling operation,

and an operating system for the control unit, wherein the operating system is provided with at least two simultaneously active preformed control modes with different control strategies, and wherein each control mode determines at least one criterion to be measured during the drilling, a threshold value for a measurement result, and at least one adjustable operating parameter, wherein one control mode can be prioritized over the other control modes such that an affect of the prioritized control mode increases and simultaneously affects of the other control modes diminish, and

the control unit is arranged to automatically adjust, based on the measurement results, the operating parameters determined by the control modes such that the drilling result according to the prioritized control mode is weighted over the other control modes.

4. (Currently Amended) A ~~control system~~ a rock drilling apparatus according to claim 3, wherein the user interface of the control unit includes an operating area of the shape of a plane geometrical polygon,

one control mode is placed in each corner of the polygon,

the user interface includes a control cursor whose location in the operating area is arranged to represent the currently selected operating point of the control, and

the control unit is arranged to calculate the weighting of each control mode depending on the distance from the operating point to the corners of the polygon.

5. (Currently Amended) A ~~control system~~ a rock drilling apparatus according to claim 4, wherein the operating system includes a triangular operating area.

6. (Currently Amended) A ~~control system~~ a rock drilling apparatus according to claim 5, wherein the first corner of the triangular operating area is provided with a control mode optimizing the penetration rate of the drilling,

the second corner of the triangle is provided with a control mode optimizing the straightness of the hole to be drilled, and the third corner of the triangle is provided with a control mode optimizing the service life of the drilling equipment.

7. (Currently Amended) A ~~control system~~ a rock drilling apparatus according to claim 3, wherein the control unit includes a graphical user interface.

8. (Currently Amended) A method of controlling rock drilling, the method comprising: drilling rock with a rock drilling apparatus including a carrier, a feeding beam, a rock drill movable with respect to the feeding beam, and a control unit for controlling the rock drilling,

providing a memory of the control unit with default settings for drilling,

measuring an operation of the apparatus during drilling, and

adjusting at least one operating parameter of drilling to accomplish a desired control operation, said adjusting step including:

providing an operating system of the control unit with at least two simultaneously active control modes with different control strategies, each control mode determining at least one criterion to be measured during drilling, a threshold value for a measurement result, and at least one adjustable operating parameter, the at least two simultaneously active control modes being at least two of a control mode to optimize a penetration rate of drilling, a control mode to optimize the straightness of a drill hole, [[and]] a control mode to optimize the service life of drilling equipment, a control mode to ease unscrewing threaded connections between drilling components, and a control mode to minimize vibration occurring in the rock drilling apparatus,

prioritizing one control mode over the other control modes such that an affect of the prioritized control mode increases and simultaneously affects of the other control modes diminish, and

calculating, based on the measurement results, control values for the operating parameters to be adjusted in the control unit in order to automatically control the drilling such that the control strategy of the prioritized control mode is weighted relative to the other control modes.

9. (New) A method of controlling rock drilling, the method comprising:
  - drilling rock with a rock drilling apparatus including a carrier, a feeding beam, a rock drill movable with respect to the feeding beam, and a control unit including a user interface and a memory with default settings for drilling,
  - controlling the rock drilling with the control unit, including:
    - arranging an operating area of the shape of a plane geometrical polygon in the user interface,
    - selecting the operating point of the control by moving a control cursor in the operating area,
    - placing one control mode in each corner of the operating area, and
    - calculating a weighting coefficient for each control mode by means of the distance between the operating point and the corners,
    - measuring an operation of the apparatus during drilling, and
    - adjusting at least one operating parameter of drilling to accomplish a desired control operation, said adjusting step including:
      - providing an operating system of the control unit with at least two simultaneously active control modes with different control strategies, each control mode determining at least one criterion to be measured during drilling, a threshold value for a measurement result, and at least one adjustable operating parameter,
      - prioritizing one control mode over the other control modes, and
      - calculating, based on the measurement results, control values for the operating parameters to be adjusted in the control unit in order to automatically

control the drilling such that the control strategy of the prioritized control mode is weighted relative to the other control modes.

10. (New) A control system for a rock drilling apparatus comprising:
    - a carrier,
    - a feeding beam,
    - a rock drill movable with respect to the feeding beam,
    - at least one sensor for measuring drilling operation,
    - a control unit including:
      - an operating system including at least two simultaneously active preformed control modes with different control strategies, and wherein each control mode determines at least one criterion to be measured during the drilling, a threshold value for a measurement result, and at least one adjustable operating parameter, wherein one control mode can be prioritized over the other control modes, and
      - a user interface for controlling the drilling, the user interface including:
        - an operating area of the shape of a plane geometrical polygon,
        - one control mode is placed in each corner of the polygon,
        - the user interface includes a control cursor whose location in the operating area is arranged to represent the currently selected operating point of the control, and
        - the control unit is arranged to calculate the weighting of each control mode depending on the distance from the operating point to the corners of the polygon,
    - wherein the control unit is arranged to automatically adjust, based on the measurement results, the operating parameters determined by the control modes such that the drilling result according to the prioritized control mode is weighted over the other control modes.
11. (New) A control system according to claim 10, wherein the operating system includes a triangular operating area.

12. (New) A control system according to claim 11, wherein the first corner of the triangular operating area is provided with a control mode optimizing the penetration rate of the drilling,

the second corner of the triangle is provided with a control mode optimizing the straightness of the hole to be drilled, and

the third corner of the triangle is provided with a control mode optimizing the service life of the drilling equipment.

13. (New) A control system for a rock drilling apparatus comprising:

a carrier,

a feeding beam,

a rock drill movable with respect to the feeding beam,

at least one sensor for measuring drilling operation,

a control unit including

an operating system including at least two simultaneously active preformed control modes with different control strategies, and wherein each control mode determines at least one criterion to be measured during the drilling, a threshold value for a measurement result, and at least one adjustable operating parameter, wherein one control mode can be prioritized over the other control modes, and

a user interface for controlling the drilling, the user interface including:

an operating area of the shape of a line segment, two control modes are arranged at first and second end points of the line segment, and

a control cursor whose location on the line segment is arranged to represent the currently selected operating point of the control,

wherein the control unit is arranged to calculate the weighting of the two control modes depending on the distance from the operating point to the first and second end points of the line segment,

wherein the control unit is arranged to automatically adjust, based on the measurement results, the operating parameters determined by the control modes such that the drilling result according to the prioritized control mode is weighted over the other control modes.

14. (New) A control system for a rock drilling apparatus comprising:
- a carrier,
  - a feeding beam,
  - a rock drill movable with respect to the feeding beam,
  - at least one sensor for measuring drilling operation,
  - a control unit including:
    - a user interface for controlling the drilling,
    - an operating system including at least two simultaneously active preformed control modes with different control strategies, the at least two simultaneously active control modes being at least two of a drilling efficiency mode, a quality mode, and a cost mode, and wherein each control mode determines at least one criterion to be measured during the drilling, a threshold value for a measurement result, and at least one adjustable operating parameter, wherein one control mode can be prioritized over the other control modes, and wherein the control unit is arranged to automatically adjust, based on the measurement results, the operating parameters determined by the control modes such that the drilling result according to the prioritized control mode is weighted over the other control modes.